<u>**Amendments to the Claims:**</u>

This listing of claims will replace all prior versions, and listings, of claims in the application:

<u>**Listing of Claims:**</u>

Claim 1 (currently amended):　　A method comprising:

<u>directly</u> detecting, using magnetic resonance imaging, regional neural activity in a subject undergoing magnetic resonance imaging ~~based on~~ <u>from and concurrently with</u> transient magnetic fields induced by the regional neural activity; and

spatially and temporally localizing the regional neural activity using at least a portion of the detected transient magnetic fields.

Claim 2 (original):　　The method of claim 1, wherein the magnetic resonance imaging comprises applying an asymmetric pulse sequence to the subject.

Claim 3 (original):　　The method of claim 2, wherein the asymmetric pulse sequence comprises a gradient-echo echo-planar image pulse sequence.

Claim 4 (original):　　The method of claim 3, wherein the asymmetric pulse sequence comprises a repetition time of between approximately 40 and 10,000 milliseconds, an echo time of between approximately 10 and 200 milliseconds, and a flip angle of between approximately 10 and 180 degrees.

Claim 5 (original):　　The method of claim 1, wherein the detecting comprises measuring magnetic resonance imaging signal magnitude changes.

Claim 6 (original):　　The method of claim 1, further comprising stimulating the subject with a hemodynamically neutral stimulation.

Claim 7 (original):　　The method of claim 6, wherein the hemodynamically neutral stimulation comprises providing rapid stimuli to the subject.

Claim 8 (canceled)

Claim 9 (original):　　The method of claim 1, further comprising performing a second nervous system measurement technique to conjoin with the magnetic resonance imaging.

Claim 10 (original): The method of claim 9, wherein the second nervous system measurement technique measures at least one of cerebral hemodynamic, metabolic, and neural activity.

Claim 11 (original): The method of claim 1, further comprising detecting intrinsic rhythms of a nervous system of the subject using the regional neural activity.

Claim 12 (original): The method of claim 1, further comprising diagnosing a disorder of a nervous system of the subject using the regional neural activity.

Claim 13 (original): The method of claim 1, further comprising analyzing a drug effect on a nervous system of the subject using the regional neural activity.

Claim 14 (currently amended): A method comprising:

performing magnetic resonance imaging on a subject; and

directly mapping electromagnetic activity of the subject via the magnetic resonance imaging from the electromagnetic activity without a temporal delay.

Claim 15 (original): The method of claim 14, wherein the magnetic resonance imaging comprises applying an asymmetric pulse sequence to the subject.

Claim 16 (original): The method of claim 15, wherein the asymmetric pulse sequence comprises a gradient-echo echo-planar image pulse sequence.

Claim 17 (original): The method of claim 14, further comprising measuring magnetic resonance imaging signal magnitude changes.

Claim 18 (original): The method of claim 14, further comprising stimulating the subject with a hemodynamically neutral stimulation.

Claim 19 (original): The method of claim 14, further comprising performing a second nervous system measurement technique to conjoin with the magnetic resonance imaging.

Claim 20 (original): The method of claim 14, further comprising detecting intrinsic rhythms of a nervous system of the subject via the electromagnetic activity.

Claim 21 (original): The method of claim 14, further comprising diagnosing a disorder of a nervous system of the subject based on the electromagnetic activity.

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Claim 22 (canceled)

Claim 23 (currently amended):   An article comprising a computer readable medium containing instructions that if executed, enable a system to:

directly detect, using magnetic resonance imaging, regional neural activity in a subject undergoing magnetic resonance imaging based on from and concurrently with transient magnetic fields induced by the regional neural activity and without inferring the regional neural activity from hemodynamic or metabolic changes; and

spatially and temporally localize the regional neural activity using at least a portion of the detected transient magnetic fields.

Claim 24 (canceled)

Claim 25 (original):   The article of claim 23, further comprising instructions that if executed enable the system to measure magnetic resonance imaging signal magnitude changes.

Claim 26 (currently amended):   A system comprising:

a magnetic resonance imaging scanner having a plurality of magnets to generate a magnetic field around a subject; and

a controller coupled to the magnetic resonance imaging scanner to directly detect a magnitude of magnetic resonance signals representing a neuronal magnetic field induced by neuronal activity.

Claim 27 (original):   The system of claim 26, wherein the plurality of magnets comprises a main magnet and a gradient magnet.

Claim 28 (original):   The system of claim 26, wherein the controller is further adapted to directly map electromagnetic activity of the subject via the magnitude of the magnetic resonance signals.

Claim 29 (currently amended):   The system of claim 28, wherein the map comprises a spatial and temporal localization of the neuronal activity of the subject.

Claim 30 (original):   The system of claim 26, further comprising a second controller coupled to the magnetic resonance imaging scanner to provide an asymmetric pulse sequence to the magnetic resonance imaging scanner.

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Claim 31 (original): The system of claim 26, further comprising a stimulus generator to provide a stimulus to the subject.

Claim 32 (original): The system of claim 31, further comprising a measurement device to measure a response of the subject to the stimulus.

Claim 33 (canceled)

Claim 34 (currently amended): An article comprising a computer readable medium containing instructions that if executed, enable a system to:

receive magnitude resonance signals from a subject of a magnetic resonance imaging system; and

process the magnitude resonance signals to ~~directly map~~ measure neuronal activity of the subject from and concurrently with neural electromagnetic changes of the subject and without a temporal delay.

Claim 35 (original): The article of claim 34, further comprising instructions that if executed enable the system to localize the neuronal activity spatially and temporally.

Claim 36 (original): The article of claim 34, further comprising instructions that if executed enable the system to generate an image based on the neuronal activity.

Claim 37 (previously presented): The method of claim 1, further comprising detecting the regional neural activity in a predetermined window prior to or after hemodynamic activity in the subject as a result of the regional neuronal activity.

Claim 38 (previously presented): The method of claim 14, further comprising directly mapping the electromagnetic activity based on magnetic resonance imaging data obtained in a predetermined window prior to or after hemodynamic activity in the subject as a result of regional neuronal activity.

Claim 39 (previously presented): The article of claim 23, further comprising instructions that when executed enable the system to detect the regional neural activity in a predetermined window prior to hemodynamic activity in the subject as a result of the regional neural activity.

Claim 40 (previously presented):   The system of claim 26, wherein the controller is to detect regional neuronal activity in a predetermined window prior to hemodynamic activity in the subject as a result of the regional neuronal activity.